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PICATINNY ARSENAL
TECHNICAL DIVISION

TECHNICAL REPORT

SUBJECT: EXAMINATION OF UNFIRED 85 MM, API-T COMPLETE ROUND OF SOVIET AMMUNITION, MOD. UBZR-365 K FMAM-2313

PROJECT NO: T53-0035 REPORT NO. 1

PREPARED BY: A. B. SCHILLING DATE: MARCH 1953

P. A. SERIAL NO: 1910 COPY NO. 45

EXAMINATION OF UNFIRED 85 MM, API-T COMPLETE ROUND OF SOVIET AMMUNITION, MOD. UBZR-365K FMAM 2313

Project No TB3-0035 — Report No 1

Picatinny Arsenal Serial No 1910 — 13 March 1953

Prepared by: A. B. Schilling

Agency Performing Work: Picatinny Arsenal

Agency Authorizing Work: Chief of Ordnance-ORDTA

Project No TB3-0035 Report No 1

Priority: DOA 2A

Project Title: Evaluation of Foreign Materiel.

OBJECT

To conduct a technical examination, including preparation of photographs, dimensioned drawings, a complete round drawing, chemical analysis of explosive charges and metallurgical examination of the projectile and cartridge case.

SUMMARY

One loaded and fuzed complete round of Soviet 85 mm, API-T Ammunition was received for technical examination. The round consists of a base fuzed, uncapped armor-piercing projectile with tracer, assembled in a primed brass cartridge case. The projectile is loaded with a high explosive charge of RDX, aluminum and montan wax. The cartridge case contains the following components: an upper closing cup, cylindrical spacer, lower closing cup, coil of soft lead wire and a bagged propellent charge with igniter charge in a pocket pad forming the base of the bag. A short type Soviet standard KB-4 Primer is assembled in the center of the cartridge case head.

The propellant is in the form of multi-perforated cylindrical grains of average 0.2489 inch OD and 0.6306 inch length.

DISTRIBUTION OF PICATINNY ARSENAL TECHNICAL REPORT NO. 1910

(PROJECT NO. TB3-0035)

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INTRODUCTION:

In accordance with request from the Office, Chief of Ordnance, Ref A, one unfired complete round of fixed Soviet manufactured 85 mm API-T Ammunition was subjected to a technical examination.

The cartridge case was forwarded to Frankford Arsenal for a metallurgical examination and preparation of a dimensioned drawing. Following visual examination Frankford Arsenal reported (Incl 8) that the cartridge case of this round was similar to one previously examined. For Frankford Arsenal report number covering the metallurgical examination of the similar case see Ref C.

The AP projectile was forwarded to Watertown Arsenal for metallurgical examination and preparation of dimensioned drawing. Results of this examination are contained in Ref B. A general examination, including chemical analysis of explosives and preparation of drawings was made at Picatinny Arsenal. Results of these examinations are contained in this report.

DESCRIPTION:

1. Complete Round

a. General

The complete round was photographed as received and following disassembly into its principal components as shown on Photograph M-41739 (Incl 1). A complete round drawing showing the round in section, marking diagram and interpretation of markings was made (See Drawing P-85205, Incl 2). The fuze is dimensionally the same as the base fuze removed from other Soviet AP projectiles. Drawing P-83975 (Incl 3) shows a fuze of this type in section with its dimensioned details. The cartridge case is crimped to the projectile by a single 360° rolled crimp into a groove machined into the projectile body to the rear of the lower rotating band.

b. Propellant

The propellent powder consists of cylindrical, multiperforated grains contained in a cloth bag. The base of this bag is of double thickness of cloth forming a pad into which the igniter charge is loaded. The mouth of the bag is closed and tied with cotton string. After the charge bag is inserted into the cartridge case a coil of soft lead wire is placed over the tied bag mouth. The lead wire is presumably used as a decoppering agent to prevent fouling of the gun barrel with copper residue from the projectile rotating bands. Forward of the charge is a waxed pressed chipboard closing cup. Nested between the open end of this lower cup and the upper cup is a cylindrical paper spacer. This spacer serves to hold the propelling charge against the primer base. The parts referred to are shown in sequential order on Photograph M-41739 (Incl 1).

c. Data

Weight of Complete Round	34.6 lb
Length of Complete Round	34.37 in
Diameter of Projectile Bourrelet	3.34 in
Diameter of Ejection flange	4.40 in

d. Marking

The markings on the Cartridge Case are black, located as shown on Drawing P-85205 (Incl 2). Translation of the legible marking is also shown on the same drawing. Stamped markings on the head are shown on Photograph M-41740 (Incl 5).

3. Projectile

a. General

The projectile consists of a steel body with two copper rotating bands pressed into knurled grooves or seats in the body. The base is of boattail design. Directly to the rear of the bourrelet is a deep, circumferential groove. It is presumed that the incorporation of a groove at this point on the projectile body may be for the purpose of controlling, to some extent, the fragmentation characteristics of the metal, particularly at striking angle of high obliquity. The body of the projectile is rough machined with the exception of the bourrelet which appears to have been ground. Traces of a thin coating of gray paint are present on the surface of the projectile body excepting the bourrelet which is unpainted. No provision is made on the body for a windshield, the design being of the monobloc type (without AP Cap). The explosive cavity is cylindrical, approximately 1 inch in diameter and 4 inches in depth. At the mouth of the explosive cavity threads are provided for assembly of the base fuze which incorporates, at its base, a tracer assembly.

A lead caulking ring seals the flange of the fuze against the shoulder of the cavity counterbore. Three paper washers and one cushion washer serve to fill the void between the fuze body and shell bursting charge.

Loading of the explosive charge, which consists of RDX, Aluminum and Montan wax, appears to have been by a pressing method.

Chemical analysis of the explosive charge is contained in the General Laboratory Report (Incl 7).

b. Data

Weight of Projectile as fired	20.27 lb
Weight of Projectile Empty	19.84 lb
Length of Projectile	10.50 in
Diameter of Bourrelet	3.340 in
Type of Base	Boattail
Weight of Bursting Charge	.11 lb

4. Base Fuze

a. General

The fuze is shown assembled to the complete round on Drawing P-85205 (Incl 2) and in section on Drawing P-83975 (Incl 3). A comparatively small tubular booster assembly, on the forward end of the fuze, is imbedded in the bursting charge. On the rearward end is threaded a tracer assembly. Photograph M-38845 (Incl 4) shows a similar fuze, disassembled.

The fuze consists of a steel fuze body, fuze primer assembly, steel arming sleeve, steel firing pin, delay charge assembly, copper delay charge washer, fiber detonator cushion, detonator assembly, booster assembly and appended tracer assembly. This tracer is initiated by the propellent gases when the weapon is fired.

b. Data

Length of Fuze & Tracer	2.58 in
Weight of Fuze & Tracer	0.22 lb
Max diameter of flange	1.137 in
Length of thread	.40 in
Number of threads	5 full
Thread data (Metric)	Major Dia - 24 mm, Pitch - 1.5 mm
Material of Body	Steel
Fuze Action	Short Delay Base Detonating, Impact

c. Functioning

Prior to firing, the fuze parts are as shown on Drawing P-83975 (Incl 3). When the round is fired, setback causes the ARMING SLEEVE to move rearward over the FUZE PRIMER ASSEMBLY, causing it to rest against the LEAD CUSHION. This action arms the fuze.

Upon impact with the target, the PRIMER ASSEMBLY moves forward impinging the PRIMER against the FIRING PIN. The flame from the PRIMER passes through to the DETONATOR initiating the DETONATOR CHARGE which, in turn, functions the BOOSTER.

d. Method of Inerting

This fuze must be removed from the projectile, by unscrewing (LH Threads) in order to render inert.

The fuze BODY held firmly in a vise or by other means (Stillson or open end wrench) will permit unscrewing (RH Thread) of the BOOSTER ASSEMBLY. The FIRING PIN will then drop out freely, as will the ARMING SLEEVE and PRIMER ASSEMBLY.

5. Cartridge Case

a. General

The cartridge case is manufactured from brass and is of conventional design. In the base is a threaded hole located centrally for assembly of the primer. Results of a metallurgical examination and dimensioned drawing of a similar cartridge case are contained in Frankford Arsenal Ordnance Laboratory Report MR 466 (Ref C).

b. Data

Length of Cartridge Case	24.75 in
Weight of Empty Cartridge Case	8.84 lb
Diameter of Mouth of Case	3.297 in
Diameter of Flat above Ejection Flange	3.91 in
Max Diameter of Ejection Flange	4.40 in

Thread Data (Metric RH) Major Dia - 28 mm, Pitch - 1.8 mm

c. Marking and Stamping

Markings on the sidewall of the cartridge case are black and are located as shown on Photograph M-41739 (Incl 1) and on the complete round Drawing P-85205 (Incl 2). Stamping on the base of the cartridge case and primer are shown on Photograph M-41740 (Incl 5).

6. Cartridge Case Primer

a. General

The cartridge case primer is of the Soviet KB-4 percussion type, standard for most Soviet artillery ammunition examined at this Arsenal to date. It is relatively short in length and does not incorporate a flash tube. A black powder pellet in the forward end is covered with a very thin copper disc.

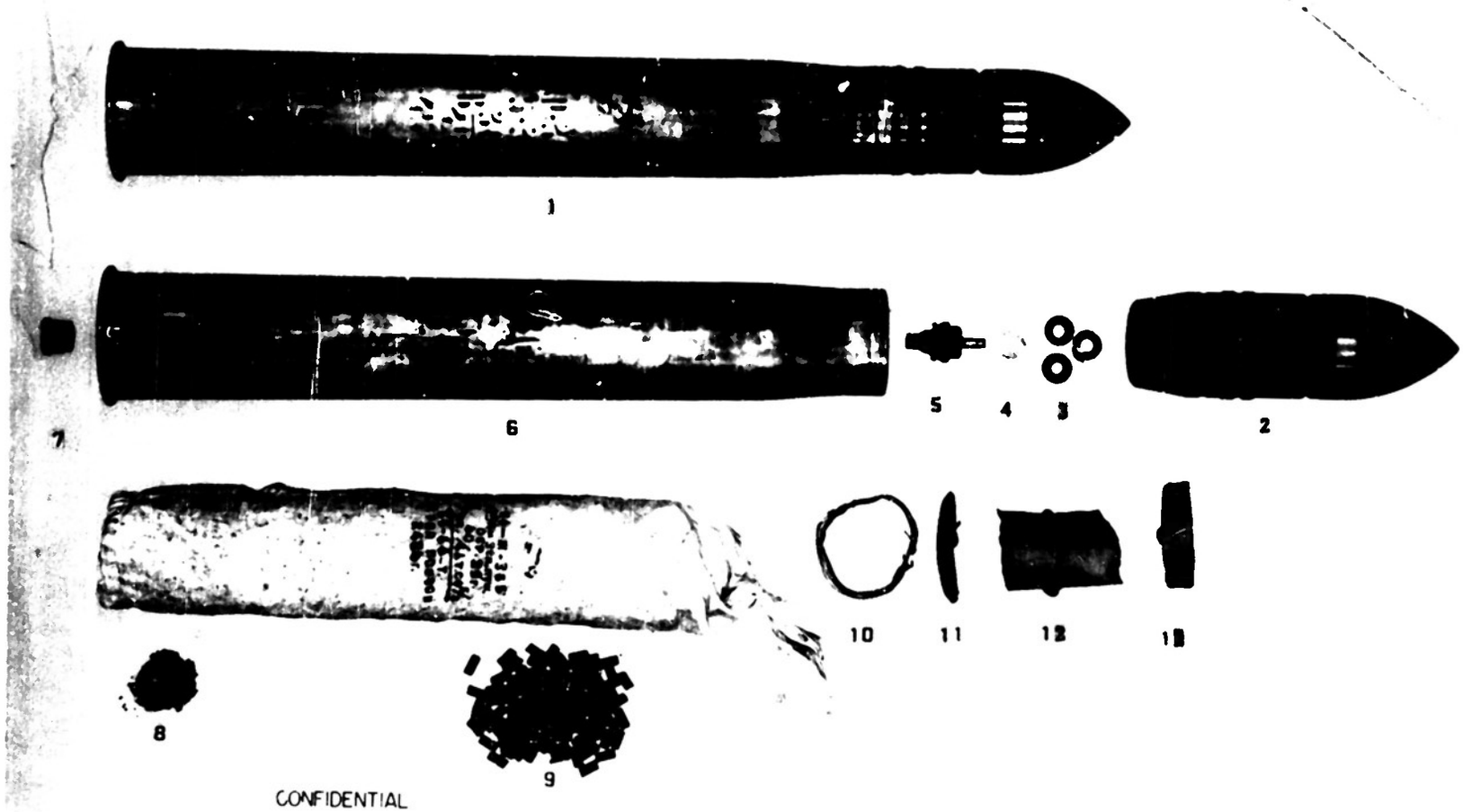
The steel body is provided with threads for assembly into the base of the cartridge case.

EXAMINATION OF UNFIRED 85 MM, API-T COMPLETE ROUND OF SOVIET AMMUNITION, Mod UBZR-365K

FMAM-2313

Report by: A. B. Schilling
Ord Design Engr

Approved: for C. W. CLARK
Col, Ord Corps
Chief, Tech Div



M-41739 November 1952 PICATINNY ARSENAL FMAM-2313 ORDNANCE CORPS

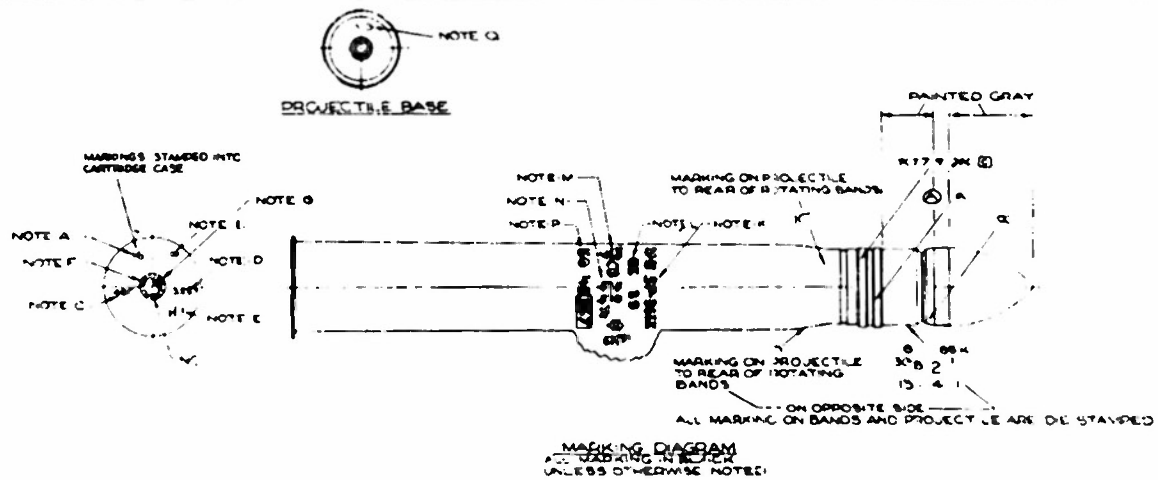
85mm Complete Round API-T (Soviet) Mod.UBZR-365K

1. Complete Round
2. Projectile
3. Spacers
4. Cushion Washer
5. Base Fuse
6. Cartridge Case
7. Percussion Primer
8. Igniter Charge
9. Propellent Charge
10. Lead Wire
11. Lower Closing Cup
12. Spacer
13. Upper Closing Cup

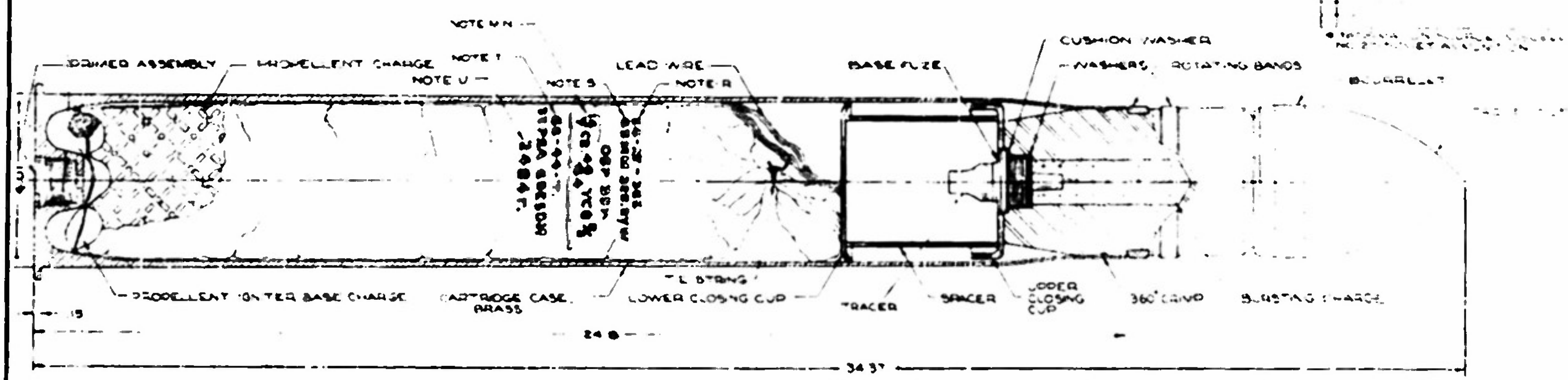
Confidential

P 65205

	LIST OF DRAWINGS	DRAWING NUMBER
1	ASSEMBLY	P65205
2	FUZE ASSEMBLY	P65575
3	PRIMER ASSEMBLY	P65410


NOTE Q
PROJECTILE BASE
MARKINGS STAMPED INTO CARTRIDGE CASE
NOTE A
NOTE F
NOTE C
NOTE G
NOTE E
NOTE D
NOTE K
NOTE M
NOTE N
NOTE P
NOTE L
NOTE H
MARKING ON PROJECTILE TO REAR OF ROTATING BANDS
PAINTED GRAY
MARKING ON PROJECTILE TO REAR OF ROTATING BANDS
ON OPPOSITE SIDE
ALL MARKING ON BANDS AND PROJECTILE ARE DIE STAMPED
MARKING DIAGRAM
ALL MARKING IN BLACK
UNLESS OTHERWISE NOTED

	ASSUMED INTERPRETATIONS OF MARKINGS	
		INTERPRETATIONS
A	16	CASE LOT NUMBER
B	8	SMELT NUMBER OF METAL
C	44Y	YEAR OF MANUFACTURE
D	7 291	FACTORY NUMBER
E	[illegible]	STAMP OF TECHNICAL CONTROL INSPEC
F	CA	DENOTES HIGH PRESSURE
G	[illegible]	LOT NUMBER & YEAR OF MANUFACTURE
H	604	ARSENAL MARK
K	[illegible]	FIXED ROUND ARMOR PIERCING INCENDIARY FILLER WITH TRACER
L	85 [illegible]	CALIBER 85MM WEAPON MODEL 939
M	[illegible]	PROPELLANT DATA 9MM OD THREE [illegible]
N	[illegible]	NO POWDER LOT MANUFACTURED IN 1944 FACTORY [illegible]
O	[illegible]	LOT NO [illegible] LOADED [illegible]
P	13	ARSENAL NO
Q	34 K 163	[illegible] WEAPON CALIBER AND MODEL
R	[illegible]	[illegible] LOT LOADED [illegible]
S	24 84 [illegible]	TOTAL WEIGHT OF [illegible]

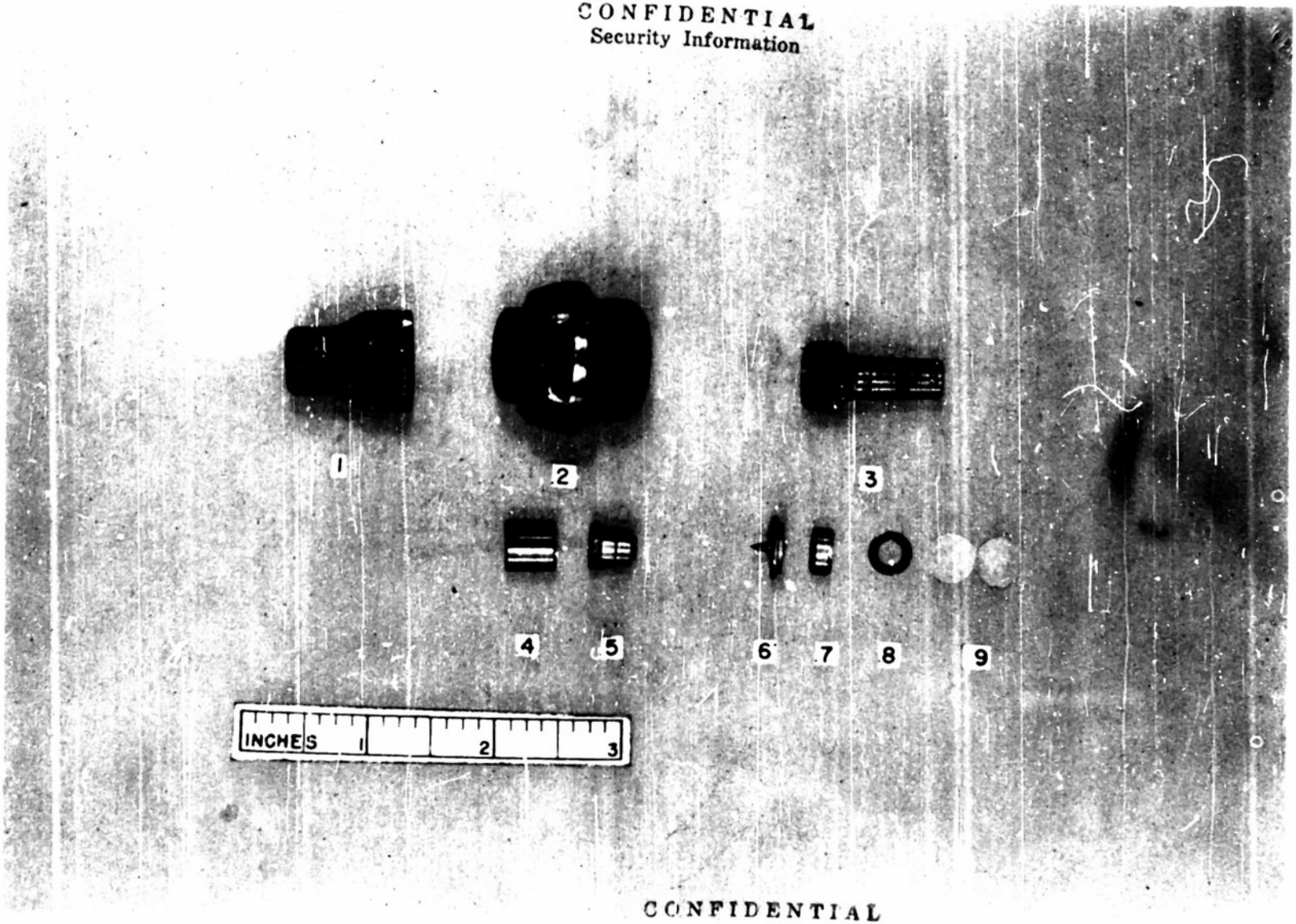

PRIMER ASSEMBLY
PROPELLENT CHARGE
NOTE M N
NOTE T
NOTE U
NOTE S
LEAD WIRE
NOTE R
BASE FUZE
CUSHION WASHER
WASHERS
ROTATING BANDS
BOURRELET
PROPELLENT IGNITER BASE CHARGE
CARTRIDGE CASE BRASS
T L STRING
LOWER CLOSING CUP
TRACER
SPACER
UPPER CLOSING CUP
360° CRIMP
BURSTING CHARGE
.15
24.8
34.37

COMPLETE ROUND ASSEMBLY

	TABLE OF WEIGHTS	
	NAME OF COMPONENT	POUNDS
1	COMPLETE ROUND	34.6
2	PROJECTILE AS FIRED	20.17
3	BURSTING CHARGE	.11
4	CARTRIDGE CASE	8.84
5	PROPELLENT CHARGE	5.34
6	PRIMER ASSEMBLY	.12
7	FUZE	.28
8		
9		
10		

NOTES
a. DIMENSIONS, WEIGHTS AND OTHER DATA OBTAINED FROM SAMPLE
b. REFERENCE: DA TECHNICAL REPORT NO. [illegible]
c. FOR ASSEMBLY DETAILS AND DIMENSIONS SEE WATERTOWN ARSENAL REPORT NO 762/644
d. FOR FURTHER DATA AND DIMENSIONS ON CARTRIDGE CASE SEE FA ORD LAB REPORT NO [illegible]

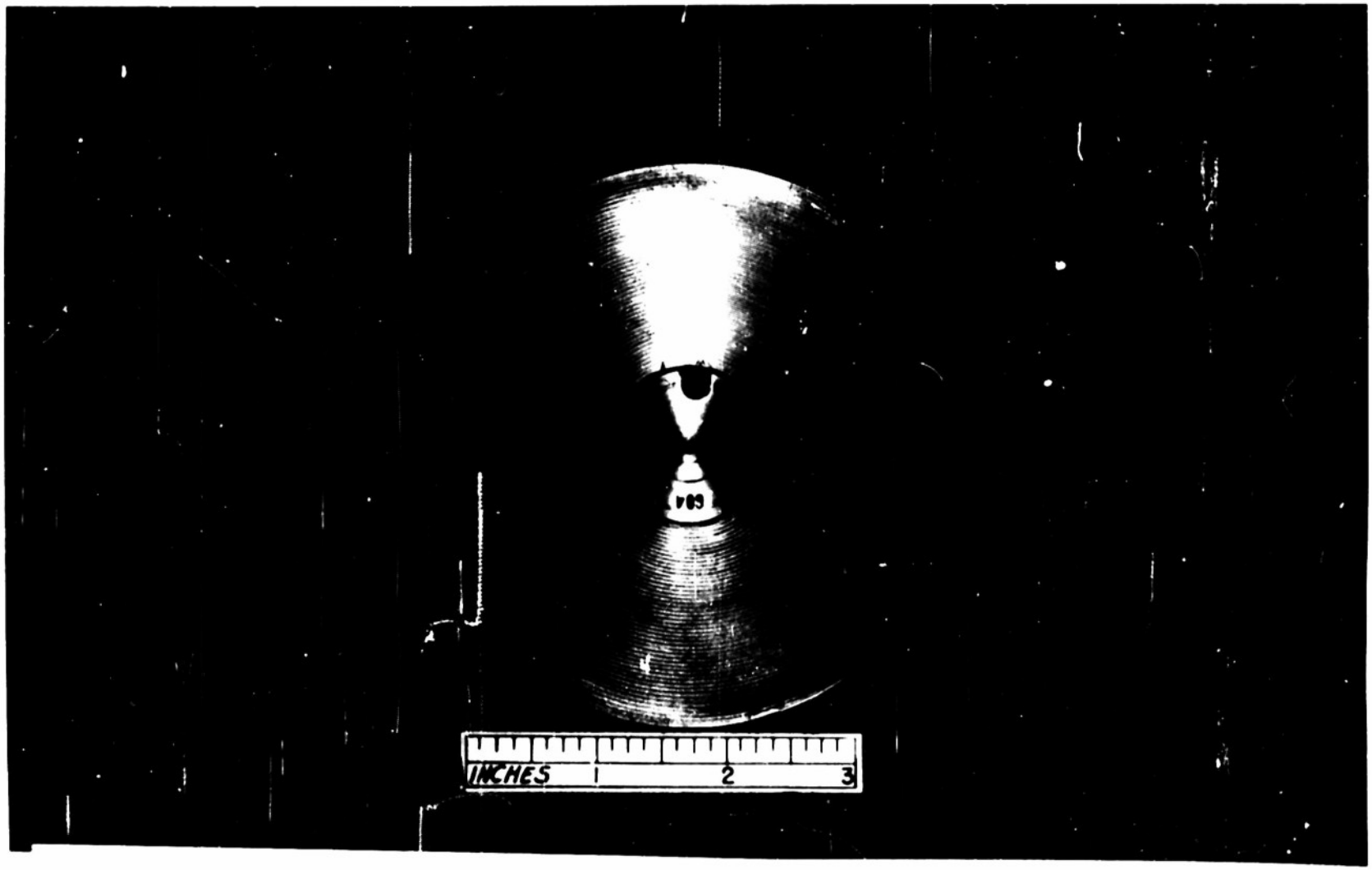
CARTRIDGE, 85MM AMMUNITION, MOD UBR 365K
FMAM 2313
ORDNANCE CORPS, DEPT OF THE ARMY
F
P 65205



14-38645 May 1951 PICATINNY ARSENAL ORDNANCE CORPS

Fuze, Base, with Tracer (Soviet)

1. Tracer Assembly
2. Fuze Body
3. Detonator Booster Ass'y.
4. Arming Sleeve
5. Primer Assembly
6. Firing Pin
7. Delay Charge Ass'y.
8. Detonator Washer
9. Closing Discs



M-41740 November 1952 PICATINNY ARSENAL FMAM-2313 ORDNANCE CORPS

85mm Fixed Round Soviet API-T Ammunition Mod. UBZR-365K

Stamped marking on base of cartridge case and primer of 85mm Fixed Round of Soviet API-T Ammunition Mod. UBZR-365K.

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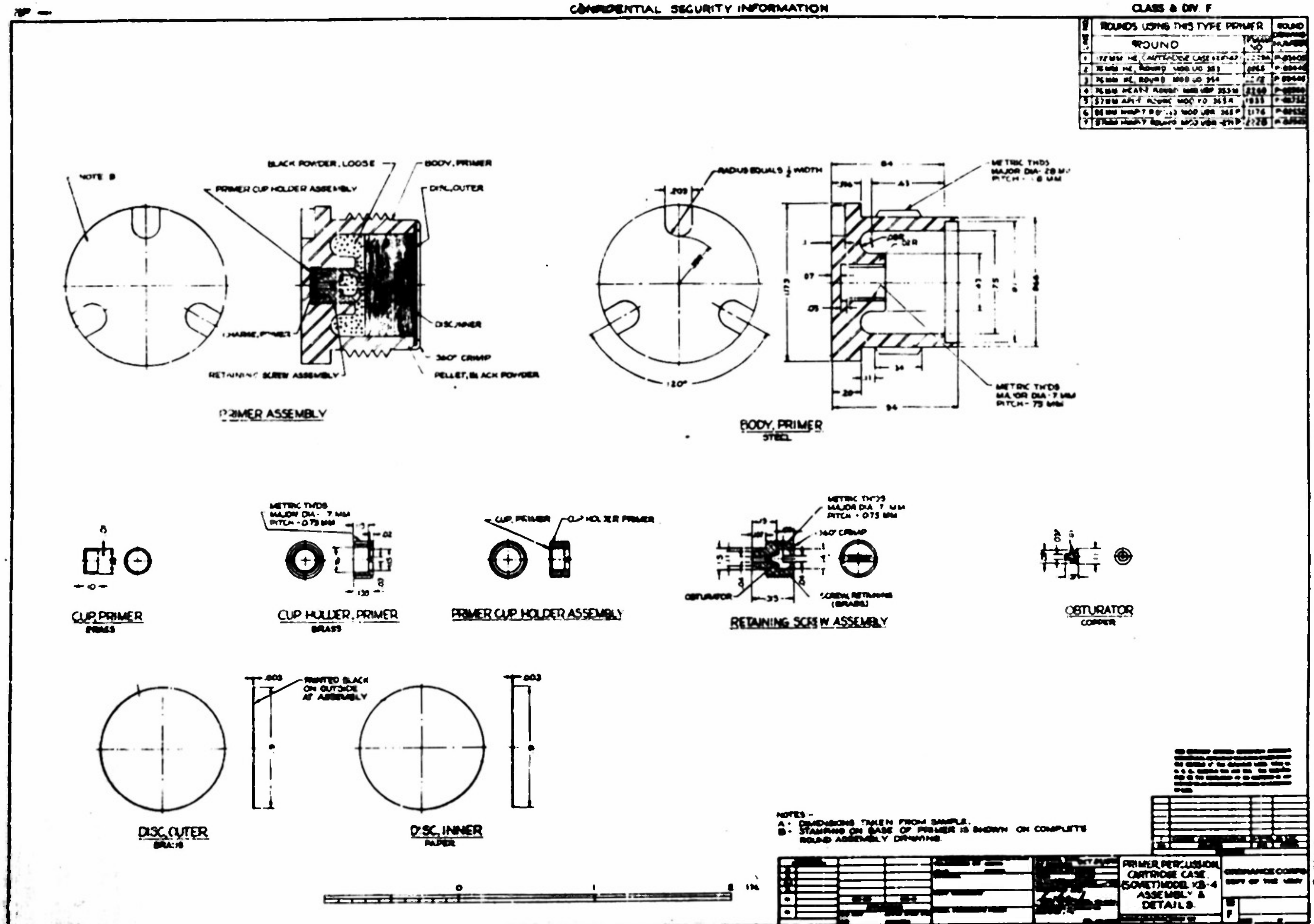
CONFIDENTIAL SECURITY INFORMATION

CLASS & DIV. F



ROUNDS USING THIS TYPE PRIMER
ROUND
NOTE B
BLACK POWDER, LOOSE
BODY, PRIMER
PRIMER CUP HOLDER ASSEMBLY
DISC, OUTER
DISC, INNER
360° CRIMP
PELLET, BLACK POWDER
RETAINING SCREW ASSEMBLY
PRIMER ASSEMBLY
RADIUS EQUALS ½ WIDTH
METRIC THDS
MAJOR DIA - 7 MM
PITCH - .75 MM
120°
BODY, PRIMER
STEEL
CUP, PRIMER
BRASS
METRIC THDS
MAJOR DIA - 7 MM
PITCH - 0.75 MM
CUP HOLDER, PRIMER
BRASS
CUP, PRIMER
CUP HOLDER PRIMER
PRIMER CUP HOLDER ASSEMBLY
METRIC THDS
MAJOR DIA - 7 MM
PITCH - 0.75 MM
360° CRIMP
OBTURATOR
SCREW, RETAINING (BRASS)
RETAINING SCREW ASSEMBLY
OBTURATOR
COPPER
PAINTED BLACK ON OUTSIDE AT ASSEMBLY
DISC, OUTER
DISC, INNER
PAPER
NOTES -
A - DIMENSIONS TAKEN FROM SAMPLE.
B - STAMPING ON BASE OF PRIMER IS SHOWN ON COMPLETE ROUND ASSEMBLY DRAWING
PRIMER, PERCUSSION, CARTRIDGE CASE (SOVIET) MODEL KB-4 ASSEMBLY & DETAILS
ORDNANCE CORPS
DEPT OF THE ARMY

P-83410

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PICATINNY ARSENAL, DOVER, N. J.

REPORT FROM THE GENERAL LABORATORY

REPORT NO. 53-H1-583

DATE 13 March 1953

Propellent Bag		
Fibers		Unmercerized Cotton
Thread Count		
One direction		71
Other direction		70
Propellent Igniter Powder		
Weight of charge, gm		25.1
Chemical Composition:		
Potassium Nitrate, %		74.9
Sulfur, %		8.8
Carbon, %		16.3
Propellent Powder		
Weight of charge, lb		5.49
Chemical Composition:		
Nitrocellulose, % (by diff)		95.64
Nitrogen, %	12.69	
Diphenylamine and nitro-derivatives of diphenylamine		1.40
Total Volatiles, %		2.96
Grain Measurements, inch		
Form	multiperforated	
L-0.6306	Avg Var % 3.05	
D-0.2489	Avg Var % 1.61	
d-0.0241		
Wo -0.0362		
Wi -0.0520		
Wa -0.0441		
Wc -0.0442		
L:D -2.53		
D:d -10.33		
Difference between Wi and Wo in percent of Wa -35.83		

SPORR-48A

REPORT FROM THE GENERAL LABORATORY

REPORT NO. 53-H1-583
DATE 13 March 1953

Tracer Assembly:	
Igniter:	
Weight of charge, gm	0.6
Chemical Composition	
Barium Peroxide, % (Diff)	75.4
Magnesium, %	20.4
Binder, %	4.2
Tracer:	
Weight of charge, gm	1.8
Chemical Composition:	
Magnesium, %	58.0
Strontium Nitrate, %	33.8
Binder, %	8.2
Fuze Assembly:	
Primer:	
Weight of charge, gm	0.023
Chemical Composition:	
Mercury Fulminate, %	21.0
Potassium Chlorate, %	42.0
Antimony Sulfide, %	37.0
Delay Charge:	
Weight of charge, gm	0.19
Chemical Composition	
Potassium Nitrate, %	74.5
Sulfur, %	10.2
Carbon, % (Diff)	15.3
Detonator:	
Top Charge:	
Weight of charge, gm	0.034
Chemical Composition	Lead Styphnate
Intermediate Charge:	
Weight of charge, gm	0.13
Chemical Composition	Lead Azide

SPOBB-4BA

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SECURITY INFORMATION

PICATINNY ARSENAL, DOVER, N. J.

REPORT FROM THE GENERAL LABORATORY

REPORT NO. 53-H1-583

DATE 13 March 1953

Bottom Charge:	
Weight of charge, gm	0.48
Chemical Composition	Tetryl
Booster:	
Weight of charge, gm	0.48
Chemical Composition	Tetryl
High Explosive Charge:	
Weight of charge, lb	0.11
Chemical Composition	
RDX, %	72.3
Aluminum, %	20.8
Montan Wax, %	6.9

REMARKS:

The chemical analysis of the primer charges was taken from General Laboratory Repor No 137062 and that of the tracer composition and fuze explosives was taken from General Laboratory Report No 51-7-951 since these components were considered to be the same as the components of this round by the Artillery Ammunition Section.

WORK BY:
A. Callanan
A. G. Villafane

SUBMITTED: E. F. Reese
E. F. Reese
Chief, Exp Anal Unit

APPROVED: A. J. Clear
A. J. Clear
Chief, Gen Lab Sec

SPORB-4SA

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SECURITY INFORMATION

12 DEC 1952 - TIME 1330

ORDBB-TE FA 471.8732/6881
SUBJECT: Metallurgical Examination of Soviet Artillery Ammunition
Project No. TB3-0035

3. In the event that no examination is decided upon, it is requested that the cartridge cases to which the above compare with be listed by indorsement to this letter for use as a reference in reports being prepared at this Arsenal covering the general Technical examination of the round.

4. Since a deformation of the mouth of the case is caused by extracting the projectile from fixed rounds, the following dimensions are furnished for reference:

Round Designation	Dia. of Projectile at Base (inches)
FMAM-2284	3.304
FMAM-2313	3.303
FMAM-2290	2.938

FOR THE COMMANDING OFFICER:

A. F. TSITSCHEID
Assistant

FA471.8732/6881
ORDBA-LC 1st Ind WQuittman/vmv/22107
ORDBB-TE 386.3/17-50 91580
Proj TB3-0035 17 1953
SUBJECT: Metallurgical Examination of Soviet Artillery Ammunition

Ord Corps, Frankford Arsenal, Philadelphia 37, Pa.

TO: Commanding Officer, Picatinny Arsenal, Dover, New Jersey

1. Cartridge Cases listed in basic letter were received and examined visually. No further investigation will be conducted. Cases examined previously with which the above compare are listed below:

76 mm (FMAM-2290) compares with 76 mm (FMAM-2153), Memorandum Report 480.

85 mm (FMAM-2284/2313) compares with 85 mm (FMAM-2176), Memorandum Report 466.